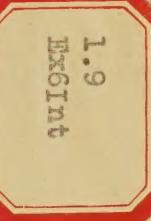


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THE INTEGRATION OF RESEARCH AND EXTENSION FOR PROGRESSIVE AGRICULTURAL ADJUSTMENTS

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Though research and extension differ widely "in nature, method, and motive," the cause which they serve is one and the same. "Research is a process of learning, while extension is a type of teaching. The field of research is the unknown, that of extension the known." In the business of agricultural advancement, research "is essentially the production or manufacturing end," and extension is "the selling or distribution end." At the one end are the research specialists, and at the other are the local farm and home demonstration agents serving the rural people. In between are the extension specialists whose usefulness depends "on maintaining contacts with both agencies, making the product more available, knowing where specialties can be found, stimulating a steady supply," ^{1/} and, let us add, a steady demand.

The term "integration," as here employed, relates to the unity, completeness, and harmony of related research and extension programs of autonomous agricultural institutions or agencies, considered either separately or as a whole. A program of effort presupposes some common objective, something of mutual concern, a goal worth striving for that can not be gained by isolated effort - something, in fact,

^{1/} Some thoughts from a paper by the late Dr. E. W. Allen, Proceedings of the Association of Land-Grant Colleges and Universities, 1926. pp. 258-264.

that challenges at once the creative thought and constructive leadership of the nation's combined research and extension forces.

Probably the advantages to be derived from collective thought and concerted action on the part of research and extension forces can best be visualized by taking stock of the progress that has been made in this direction and comparing it with the size of the undertaking involved in the matter of endeavoring to advance agriculture and rural life. Though much has been accomplished, evidently much remains to be done before ultimate goals are attained.

Now, What is the challenge of American agriculture and rural life to the nation's allied research and extension forces? Farms are to be progressively adjusted to ever-changing physical, biological, economic, and social conditions. Production is to be synchronized with demand, marketing machinery perfected, costs of distribution reduced, consumption encouraged, the quality of farm products improved, outlooks perfected and used, tax burdens lightened, public services improved, credits made to serve changing rural requirements, the value of gold stabilized, competition met, and lands properly utilized. Both the forces of nature and of human society are to be made to work for, rather than against, the farmer and his family. The growing efficiencies and capacities of farmers are to be diverted from the production of unprofitable surpluses to the realization of remunerative incomes, praiseworthy standards of rural living, and cultural advancement. To attain these cherished objectives, greater power and effectiveness must be developed by the nation's research and extension agencies. Both types of endeavor must be progressively perfected and more intimately associated in a great general plan of agricultural advancement.

Efforts leading to agricultural improvement are by no means new. They have been going on since the dawn of civilization. Ages of time and enormous wastes of human life were required for the transition of our primitive ancestors from the hunting to the pastoral and from the pastoral to the agricultural stage. Learning to till the soil and to domesticate plants and animals were of such significance as to be attributed to the wisdom of the gods. Still more eventful were the invention of farm implements; the improvement of soils, crops, and livestock; and the control of diseases and insect pests. So effective have been these varied improvements, in American agriculture, that from early colonial times to the present, food, feed, and fiber crops have seldom been scarce relative to demand. Upon the whole, farmers have made greater progress in subduing the forces of nature and expanding their productive capacities than in fathoming the economic forces and making a financial success of the business of farming.

Great as has been the progress in matters of primary production, however, many fundamental problems remain unsolved. There is still room for discoveries of vast economic and social significance, for example, in the fields of agricultural engineering, soil fertility, plant and animal genetics, breeding, nutrition, diseases and insect pests. In the evolution of agricultural economics and rural sociology, therefore, the physical and biological sciences are not superseded or set aside. The two groups of sciences are mutually dependent. One cannot be developed advantageously at the expense of the other. In the nation's efforts to achieve rural advancement, it will have abundant need for the harmonious results of the physical and biological, as well as the social, sciences.

Appreciation of the importance of the economic and social problems of agriculture has arisen rather belatedly out of the transition from the self-sufficient

stage of farming to that in which production is primarily for the markets of the world. This transition has been accompanied by agricultural expansion, depression, and attendant ills with which farmers were not prepared to cope. For example, neither incentives nor facilities for expansion were lacking at the close of the Civil War. The chief incentive was high prices during and immediately following the war, and the facilities were certain improvements in farm implements and machinery, lands in abundance, and increasing technical scientific knowledge. Both the numbers of farmers and their capacities to produce were greatly increased. Acreages cultivated expanded rapidly, and surpluses of farm products were created which the markets of the world could not absorb at highly remunerative prices. Then followed low prices, depression, and rural unrest which continued until about the time of the Spanish-American War. By that time acreage expansion had slowed down, consumption had increased relative to production, and the supply of farm products had become somewhat better adjusted to market requirements.

For a time thereafter prices tended to improve, and agriculture might have become established on a higher plane of prosperity had not other events brought on a second depression. The first of these was the introduction of dry-farming methods and drought-resistant crops which brought the semiarid region under the plow; the second was the invention of still more efficient farm implements and machinery; and the third was high prices following the World War which, again, served as an adequate incentive for further expansion resulting in burdensome surpluses and another cycle of low prices, rural unrest, and renewed efforts to bring about needed adjustments in American agriculture. Needless to say, we are still in the midst of this depression. It is the joint function of research and extension to point the way out.

Though progress may appear to be made at too slow a pace, especially in time of emergency such as this, the evidence at hand is far from discouraging. From the beginning the principles of cooperation, correlation, and integration have been as much a part of the research and extension policies of the United States Department of Agriculture and the land-grant institutions as the scientific method of research itself.

According to the records of the Office of Experiment Stations for 1930, 1,196 of the 7,000 active projects at the stations are now being conducted cooperatively by stations or groups of stations and the Department of Agriculture. The number recorded the previous year was 1,086, indicating a net increase of 110 projects, or about 10 per cent. This does not represent the number of new cooperative projects, however, as in the neighborhood of 100 such projects were reported as completed or closed during the year. This record of cooperation includes all of the State agricultural experiment stations - California, Washington, North Carolina, Montana, Wisconsin, Virginia, and Oregon leading with 53, 49, 48, 41, 40, 36, and 36 cooperative projects, respectively. In the neighborhood of 21 major regional projects are in operation which involve the cooperation of groups of stations varying in number from three to more than thirty, and include from one to three Federal bureaus. Of 114 permanent substations, about 40, distributed over 21 States, are operated in cooperation with branches of the Department of Agriculture, while more than 50 Federal stations are maintained independently of State stations, according to the Survey of Land-Grant Colleges and Universities.

At the first meeting of the American Association of Agricultural Colleges

and Experiment Stations in 1887, 2/ Dr. W. O. Atwater, of Connecticut, read a paper on "Coordination of Work in Experimentation," following which a committee was appointed to further cooperative relationships. In 1899, 3/ another committee was "appointed to consider the question of cooperative work of the experiment stations with the Department of Agriculture." In its first report, 4/ the committee said "The attitude of the present Secretary of Agriculture toward closer cooperation between the Department and the stations, and toward more systematic arrangements for such cooperation, meets with very general approval from directors of experiment stations."

In 1906, 5/ the Association appointed a Commission "to consider the organization and policy that ... should prevail in the expenditure of public money provided for scientific experimentation and research in the interests of agriculture." In its 1908 report, 6/ the Commission stated that (1) "The development of research effort has not been symmetrical and logical." (2) "There has been no well-defined general agreement as to what should be the relative functions of the two classes of agencies, State and national, in the promotion of agricultural research and, therefore, no clear, definite policy has been developed regarding their correlation." (3) "On many questions the harmonious cooperation of the two agencies is essential to the highest efficiency of effort." (4) "Investigation into the business, economic, social and governmental conditions affecting agriculture should be undertaken and should be maintained on a permanent-

2/ Proceedings of the First Annual Convention of the Association of American Agricultural Colleges and Experiment Stations. 1887. p. 4.

3/ Proceedings of the Thirteenth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations. 1899. p. 55.

4/ Proceedings of the Fourteenth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations. 1900. p. 58.

5/ Proceedings of the Twentieth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations. 1906, p. 61.

6/ Association of American Agricultural Colleges and Experiment Stations, Report of Commission on Agricultural Research. 1908. pp. 6, 7, 8, 17, 21.

and effective basis." Commenting upon the report, Gifford Pinchot, a member of the Commission said: "One of the fundamental and more pressing needs of science in America is more and better research. I can conceive of no more effective way to promote research in agriculture than to bring about the active cooperation and coordination of existing agencies for the execution of a great general plan. The result will be felt in the increased scope, economy, and efficiency of both State and national organizations."

In 1913, ^{7/} the "Joint Committee on Projects and Correlation of Research," consisting of three members from the Department of Agriculture and three from the stations, was appointed. In its efforts to promote research and research correlation, this Committee has accomplished much, and it continues to function.

In 1919, ^{8/} a resolution was adopted by the Association, as follows: "That we urge the closest possible cooperation at this time among all agricultural agencies and organizations, public and private, in a supreme effort to prepare a more adequate program for the development of American agriculture and country life."

In 1922, ^{9/} the Committee urged "still closer correlation of research between the respective States and the Federal Government." In 1925, ^{10/} the Committee reported that "The work of the joint committee on projects and correlation of research during the past year has in some respects been the most important of any year since its appointment." It had participated in the development of "a great

^{7/} Proceedings of the Twenty-Seventh Annual Convention of the Association of American Agricultural Colleges and Experiment Stations. 1913. p.115.

^{8/} Proceedings of the Thirty-Second Annual Convention of the Association of American Agricultural Colleges and Experiment Stations. Jan. 1919. p.112.

^{9/} Proceedings of the Thirty-Sixth Annual Convention of the Association of Land-Grant Colleges. 1922. p.160.

^{10/} Proceedings of the Thirty-Ninth Annual Convention of the Association of Land-Grant Colleges. 1925. p.184.

movement for cooperative research on a series of national projects." Following the passage of the Purnell Act in the winter of 1925, 11/ a conference of State and Federal administrative officers and investigators was called by the Joint Committee to meet at St. Louis, Missouri, for the purpose of formulating "plans for the promotion and development of cooperative research between the United States Department of Agriculture and the State experiment stations." At that meeting six national cooperative projects, or fields of work, were selected, as follows:

1. Distribution and marketing of farm products
2. The problem of surpluses of farm products
3. Vitamin content of food in relation to human nutrition
4. Rural home management studies
5. Rural social organizations and agencies essential to a permanent and effective agriculture
6. Factors influencing the production and quality of meat."

The passage of the Purnell Act and the appointment of special research committees in charge of the six national cooperative projects stimulated new interest and activity in cooperative research. They mark the beginning of a broad, general plan of national cooperative research involving definite economic and social objectives. In the five years which have elapsed, much has been accomplished in the number and importance of State and national programs, in the development of a spirit of cooperation, and in the published results. It is realized more generally than ever before that if research and extension are to measure up fully to their great responsibilities, the major problems of agriculture must be clearly visualized and all the powers of modern science, invention, and constructive leadership brought to bear upon their solution. Existing projects and programs must be reexamined at frequent intervals with reference to objective

11/ Proceedings of the Thirty-Ninth Annual Convention of the Association of Land-Grant Colleges. 1925. p.184.

and relative importance. Ill-designed, or "merely interesting," researches must be weeded out and new ones projected to fill in the gaps. Isolated efforts must be woven into harmonious programs of forward-looking research and extension activity.

The recent reports of the special committees are very instructive and carry valuable suggestions concerning future developments. The Committee on Factors which Influence the Quality and Palatability of Meat reports that 25 State experiment stations are cooperating with the Department of Agriculture in a nationwide program of meat researches. "After five years of cooperative effort since recognition by the Association," says the report, "it is the opinion of cooperators in the meats project that rather remarkable strides have been made. Not only is active cooperative research by such a great number of independent units new, but the project itself is unique in animal husbandry research. . . . The findings at one station often lead to sounder interpretation of those of another. One investigator's erroneous hypothesis may be the inspiration for another worker's closer scrutiny of his own projects. There is a pooling of ideas, of resources, of ingenuity, of specially-trained services which may be unique, and which may represent a lifetime of training of an individual scientist - all these are the strength of true cooperation."

The Special Committee on Rural Home Management Studies also reports worth while progress in its field. More than 50 per cent of the work promoted by this Committee now extends beyond its original field. The interest originally placed upon management of time and food consumption has been shifted to studies of standards of living, home equipment, and management of finances. The advisory and clearing house functions of the Committee have not been adequately amplified.

The report concludes that "the large proportion of independent projects so far undertaken also suggests that it would be well for the Committee to draw up new national projects, or to revise its present ones in order to meet the interests of those States to which the existing projects do not appeal, or which have already cooperated in them."

The committee promoting vitamin researches reports that uniform methods are being evolved, and results obtained are being applied to everyday problems of family diet.

Cooperative studies in the field of marketing have made a remarkable growth. Originally local and poorly supported, they now assume national and international proportions. Farmers are beginning to understand something of supply-price relationships, outlooks, and foreign competition. During the year just past, the Committee on Rural Social Organizations and Agencies held an Institute of Methods in Rural Sociological Research, which 60 specialists - exclusive of those in Washington - representing 26 States and 2 foreign countries, attended. The work accomplished is already bearing excellent fruit.

At the November, 1930 meeting of the Association of Land-Grant Colleges and Universities, the Joint Committee on Projects and Correlation of Research, in its annual report, commented upon the work of the six national cooperative projects as follows: "In view of the remarkable progress that has been made in agricultural research in the five years which have elapsed since the passage of the Purnell Act, the Committee raises the question whether the original purposes of the six 'National Cooperative Projects,' or fields of study, selected at the St. Louis conference have not been largely accomplished, and whether these projects should not be discontinued, and major coordinate fields of regional or national cooperative effort defined so as to serve better the national needs, present and prospective."

It will be noted from this report that the Joint Committee recognizes the remarkable progress that has been made in agricultural research since the passage of the Purnell Act but questions whether the present national cooperative projects are sufficiently comprehensive to serve the national needs. The questions raised in the report and in subsequent discussions of it were referred back to the Joint Committee by the Experiment Station Section of the Association for further consideration and report.

The spirit of cooperation is, of course, inherent in the nation-wide system of extension work. It is provided for in the Smith-Lever Act and in uniform memoranda of agreement entered into by the Federal Department and the States. These memoranda provide that neither agency will engage in extension activities except in cooperation with the other. Practically all financial support for extension - whether Federal or local - is contingent upon cooperation. Though extension activities may lend themselves more readily than research to universal cooperation, the fact remains that the advantages of cooperation in research have not been fully exploited.

The State and Federal fields of research and extension have become pretty well defined. In matters of adjustment within the States, the leadership of the agricultural colleges is of primary importance, while in adjustments of broad national significance, the leadership of Federal departments becomes essential to success. In State programs of advancement, the Federal agencies can help the States, and in national undertakings the State institutions can help the Federal. The place to begin cooperation, correlation, and integration, therefore, is "at home" - in Federal departments and State institutions. It is thought that an agency that has adjusted its own internal relationships is in best

position to coordinate its efforts with those of another. The Federal Department of Agriculture, through its directors of Scientific Work and Extension, with the aid and assistance of bureau chiefs and specialists, is endeavoring to perfect its programs of research and extension and to assure logical articulation. As State and Federal agencies round out their respective programs, it may be reasonably anticipated that their integrated efforts will become increasingly significant

In one of the States, the dean of agriculture has made the entire matter of research and extension in relation to each other and to the problem of agricultural adjustment the subject of a research project, of which he is the senior leader. The project is an interesting one because of the teamwork which it implies and the scientific spirit and vision of ultimate objectives behind it. The lessons to be learned should prove very helpful in the development of other adjustment programs.

Those inclined to become impatient with research and extension as means of progress should not overlook the fact that their perfection, like human advancement in general, is a matter of progressive evolution. The facilities, projects, and programs which seem to satisfy present needs may prove inadequate for future requirements. The relationships which yesterday were intimate enough may seem distant tomorrow. Particular attention should, therefore, be paid to what has been termed the "twilight zone" of the two fields of endeavor. Some kind of articulating mechanism is needed to perfect their functioning. Considerable interest is developing in methods and facilities for determining whether new scientific discoveries can actually be given practical application on the farms and in the lives of rural people. More experimentally ascertained facts are needed concerning farm organization, home equipment and management, standards of living, and community development.

Even at the present time examples of economic experiments in both industry and agriculture are not entirely lacking. Some industries supplement their research departments with "pilot" factories, wherein scientific discoveries may be applied and the products tested practically before putting them on the market. Likewise, the Federal Department of Agriculture and most of the State experiment stations have for many years maintained "pilot" or branch experiment farms, supplementary to their central laboratories, upon which the hypotheses and theories of research specialists have been tested. In intensity, the work of these farms has varied from advanced researches to the more elementary feed, fertilizer, and variety tests. Examples are numerous in which experiments yielding positive results have become very effective demonstrations, attracting widespread interest and influencing the agriculture of the regions in which the farms are located.

In more recent years, many of the stations have also made encouraging progress in the study of the economic problems involved in farm organization and operation. The customary procedure has been to subdivide the State into rather distinct type-of-farming areas within which intensive studies are made by either survey or the cost-accounting method of approach. Following these studies, what amount to pilot farms are selected upon which promising types of organization may be perfected and subjected to further analysis. The patterns of organization which make the best showing over a sufficient period of time are reported and recommended to farmers in the type-of-farming areas. If the comparisons involved in testing these patterns were checked in a manner similar to those of a physical experiment or a variety test, they would become experiments in the usual sense of the term. This testing of types of organization and of enterprises should contribute much to their reliability and to the readiness with which they are accepted by farmers.

In some of the range States, pilot, or ranch economics experiment, stations have been established, upon and around which technical and economic researches are conducted almost side by side. Out of these studies profitable types of ranching are being evolved. In one of the States, the business of wheat farming is studied cooperatively by State and Federal agencies on land owned by a benevolent corporation whose profits, if any accrue, go to the State agricultural experiment station. On this pilot farm, various experiments concerning the size of unit, kind of equipment, farm organization, and plan of operation are conducted jointly by the farm economist and the agricultural engineer. Other specialists also contribute to the experiments. In the operation of this farm, care is exercised to avoid anything suggesting that its success is attributable to chance, or favorable circumstances. To this end, all expenses connected with the experiments and investigations involved are kept separate and apart from the operating expenses and receipts of the farm. The successful patterns which emerge from the tests become convincing demonstrations. They are visited by many farmers and, directly or indirectly, wield an important influence for the good of agriculture and rural life.

The standard of living is also beginning to serve as a nucleus around which to crystallize research and extension programs. From this point of departure the procedure is to determine an attainable standard of living for a particular farm family or community and thereafter determine what forms of farm organization and adjustment will yield the necessary income. Such procedure seems very logical for the reason that people should farm to live rather than live to farm. ^{12/}

Again, the "Outlook," participated in by the States and the Federal

^{12/} See Standards of Living as a Basis for an Agricultural Extension Program, by Madge J. Reesc, Senior Home Economist, Office of Cooperative Extension Work. Paper read before Association of Land-Grant Colleges and Universities November 19, 1930.

Department, is fast becoming a rather constructive instrument for the correlation of effort. It serves as a nucleus around which more and more research and extension activities center. Though considered as extension ordinarily, the Outlook can be of no greater merit than the researches behind it. Back of it are the specific researches of the Federal bureaus and agencies at home and abroad and the State experiment stations. By bringing together their respective contributions, the great body of knowledge necessary for effectual adjustments will be made available to extension workers. The function of extension in outlook work is to help prepare this knowledge in assimilable form and "sell" it to rural groups.

Needless to say, there is no "royal road" to agricultural information. The projects involved in the programs of research surrounding the Outlook will be specific and to the point and otherwise in conformity with sound procedure. An all-inclusive project entitled, "The Agricultural Outlook" does not comply with the requirements of scientific research. The assembling and harmonizing of known facts is a "twilight" function that has long been neglected. It is an inviting field for a rather new type of extension specialist - one who is intimately acquainted with researches under way, on the one hand, and with the needs of extension, on the other. His duty is to scrutinize the findings of research and to present them in suitable form for extension. Material so prepared is especially demanded at the present time in connection with farm management, marketing, and social adjustment campaigns. Probably a larger supply of such talent will arise out of the number of economic extension specialists now being employed by the States and the Federal Department.

As research and extension relationships are perfected, the customary lag

between the discovery of important truths and their general adoption in practice will be materially reduced. Without detracting in the least from the scientific merits of projects and programs, they can be designed so as to serve more directly the prospective requirements of extension, which, when broadly interpreted, are identical with the needs of agriculture and rural life. Farmers, as a rule, are more conscious of their present than of their future needs. Their future advancement, therefore, is contingent upon the "capitalization" of their more immediate interests. The strength of an adjustment program is measured by the extent to which it provides for both present emergencies and future requirements. The immediate function of a forward-looking adjustment program is to diagnose the ills of agriculture and to apply restoratives, while its ultimate function is to bring permanent relief by removing the causes of the troubles.

From the deliberate, scientific study of research and extension in their relations to each other and to their major objectives, will eventually come a great general plan of agricultural advancement. Both time and money will be saved, or used to greater advantage, and the creative efficiencies and capacities of American farmers and farm families will be the more quickly diverted from the production of unprofitable surpluses to the realization of remunerative incomes and praiseworthy standards of living and culture.

SUMMARY

(1) Agricultural research and extension have a common objective in the advancement of American agriculture and rural life. Their respective projects and programs are gradually being perfected and integrated into a great general plan of aggressive action.

(2) The major obstacles confronting agriculture and rural life should be more clearly visualized and all the powers of modern science, invention, and constructive leadership brought to bear upon their removal.

(3) Whereas in earlier times, the major economic problem was to produce food and fiber crops in sufficient volume to feed and clothe the people, today it is how to produce more effectively, adjust volume of products to demand, to promote consumption, and to sell to better economic advantage.

(4) Interest in rural economic and social problems has arisen out of the transition from the stage of rural self-sufficiency to that in which production is primarily for the markets. The immediate reason for this interest is found in the fact that this transition has been accompanied by agricultural expansion, low prices, depression, and attendant economic and social problems with which rural people have been ill-prepared to cope.

(5) Though noteworthy progress has been made in the matter of correlating both research and extension as separate forces, much remains to be accomplished in the matters of articulating and integrating them into a great dynamic force and training it upon the major objective.

(6) The Smith-Lever Act of 1914 was the signal for the initiation of a nation-wide movement in cooperative extension. The Purnell Act of 1925 marks the beginning of a broad, general plan of cooperative research involving definite national economic and social objectives.

(7) The place to begin correlation and integration of research and extension is "at home" - in Federal departments and bureaus and in State institutions. The reason is that an agency which has adjusted its own internal relationships places itself in best position to make important contributions when cooperating with others.

(8) Research-extension programs logically center around certain fields of major interest such, for example, as a particular commodity, soil improvement, land utilization, farm organization, agricultural outlook, marketing, home management, standard of living, or community advancement.

(9) In one of the States, the dean of agriculture has made the entire problem of perfecting and integrating research and extension programs for the purpose of bringing about needed adjustments between production and demand the

subject of a specific research project. This project is a very interesting one because of the teamwork which it implies and the scientific spirit and vision of ultimate objectives behind it. The results to be obtained from such studies as this should tend to clarify thinking with reference to all forms of agricultural adjustment.

(10) More attention is being paid of late to problems of articulation falling within the "twilight" zone between research and extension. "Pilot" or experimental units, such as are commonly employed by industries maintaining research departments for testing the practicability of new scientific discoveries, might be used to greater advantage, for example, in testing patterns of farm organization, home equipment and management, and community development; as well as in the older fields of agronomy, animal husbandry, and horticulture.

(11) The assembling, harmonizing, and adapting of known facts emanating from research to the needs of extension is a twilight function that has long been neglected. Not being research, this is an inviting field for a rather new type of extension specialist - one who is intimately acquainted with both the progress of research and the subject-matter needs of extension.

(12) More and more, the standard of living is serving as a nucleus around which to crystallize agricultural adjustment or readjustment programs.

(13) The "Outlook" is fast becoming a constructive instrument for the correlation of research and extension activities.

(14) Through correlation and integration, the customary lag between the discovery of important truths and their general adoption in practice will be materially reduced and time and money saved. Projects and programs will be strengthened and made more effectual. Both the forces of nature and of human society will be made to work for, rather than contrary to, the interests of the farmer and his family. The growing efficiencies and capacities of rural people will be diverted from the production of unprofitable surpluses and all that they imply to the realization of remunerative incomes, praiseworthy standards of rural living, and cultural advancement.